

NEURON[°] AI

AI BlockChain for Decentralized Economy

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White Paper

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Exclusion Clause

This document is intended to provide information to anyone who is interested in Neuron© AI, including the philosophy and technical details of the Neuron© AI Ecosystem. The Neuron© AI Team is putting in reasonable amount of efforts to deliver the latest information through updates after carefully reviewing the material and the technical details. However, the team does not guarantee any accuracy or completeness of all the contents stated in this document. The contents of this document were provided at the time that was written, therefore the parts of the contents do not possess any binding powers or obligations. Therefore, the Neuron© AI Team is not liable for any damages caused by inaccurate or incomplete information, nor using or not using the information stated in this document. Also, the Neuron© AI Team is not responsible for any other activities involving this document other than its original purpose of providing information. Any information included in this document such as the Neuron© AI Ecosystem should not be copied, modified, and distributed illegally without prior consent from the Neuron © AI Team. If terminologies or expressions in this document are against the current law, they will lose validity before they are revised, but the rest of the document shall remain valid.

Foreword

Artificial Intelligence for What?

Since the appearance of Cybernetics in the early 20th Century, many Artificial Intelligence (AI) scientists and engineers went through numerous trials and errors to prove, realize, and sometimes dismiss and fail various theories to understand intellectual behaviors of human. Regardless of the questions asked and how we answered them, what is the ultimate goal for AI research? It is not to fulfil the intellectual curiosity but when it comes to serve the mankind that is the reason why our Neuron © AI Team is dedicated to AI.

Blockchain is emerging to be the topic of conversation. It is a revolutionary idea as it is shifting the paradigm of existing technology. Not only blockchain is a technological innovation based on an open idea, we cannot disregard the fact that people are fascinated over cryptocurrencies based on blockchain. Are we just going to treat this innovation as the 'Tulip Fever'?

Artificial intelligence is a technology that can change our future, but the monopoly of research and development resources is a big problem. Artificial intelligence research requires three elements: data for learning, artificial intelligence algorithms, and computing power. The data generated by ordinary users is dominated by few big corporations such as Facebook, Google and Amazon. Many of the people who develop algorithms work for giants such as Google, Baidu and IBM. Dominant players in the computing power market are, again, for Amazon, Google, and Microsoft. If the research and development of artificial intelligence proceeds as it is, artificial intelligence will become the property of these giant corporations rather than human assets.

We, the Neuron © AI Team, as artificial intelligence researchers, propose **Ecosystem** as a global shelter to make artificial intelligence a property of humanity. Individuals are willing to provide their own idle resources of computing power, to create data needed for artificial intelligence research and to be rewarded for their worth. In addition, the **AI Society**, an alliance of AI researchers, developers and start-up companies, aims to share their capabilities in the AI field so that fair rewards will be given. Artificial intelligence should be the property of all mankind, not private property of a certain.

“AI BlockChain for Decentralized Economy”

Introduction

The Problems of Early Cryptocurrency

Where does value come from?

Currency has four major functions: a standard of payment, a measure of value, a store of value, and as a medium of exchange. The role of the currency differs as the function for each is performed independently and systematically, but the common implication is the calculation of the value. In a modern society, economy was run on the gold-exchange standard, in which a centralized organization (i.e., the nation) decided the proportion of the monetary value by force (i.e., the law), using a certain material (i.e., gold) as a meaning of proof, therefore, granting value to the currency. But after the World Wars and with the problems in Bloc Economy, it became hard to sustain the gold-exchange standard. As a result, today's floating exchange rate system appeared, where value is determined according to each nation's strength, making it easier to transact capitals between nations. On the other hand, nation enforces currency by law in order to preserve its value and stability. This kind of currencies are called legal tender or fiduciary money. These types of currency usually exist in the form of fiat money, where grants value by force are irrelevant to the intrinsic value. The value of fiat money is secured by the nation's credit, which is calculated through the nation's productivity, economic policies, etc. Exchange rate is set by comparing each nation's credit. In other words, if a nation's credit decreases and its economy cannot support the circulating currency, the value of its currency conspicuously decreases and even gets deprived. So, the value of currency, which relies heavily on centralized power, is sometimes swayed by internal or external factors, and sometimes even loses the fiat value due to unjust policies. In 2009, Nakamoto Satoshi suggested Bitcoin, a cryptocurrency system based on blockchain through decentralized shared ledgers, excluding the compulsory circulation. Blockchain system records transactions or the issue of coins on shared ledgers, so called blocks, encrypts them and stores them in a distributed form, all by functioning as an independent currency from centralized organizations. Value is admitted by those who make transactions with this currency, just like fiat money. So, what is relevant to the intrinsic value of cryptocurrencies?

Limitations with the Proof of Work

Added value occurs when the value of output is increased by the value of resources put into. If a certain activity generates few added value or even a loss, it should be reconsidered whether to keep this activity. On the other hand, if the added value is significantly higher than the invested, this can be considered as an overheated situation rather than a proper reward. And if it is determined as an economic bubble, the value will be adjusted to the same level of the invested by the principle of the market economy. Then, where does the value of cryptocurrency come from? For existing cryptocurrencies, transaction records were recorded and verified in the form of distributed ledgers using the Proof of Work (PoW), ensuring safe and decentralized transactions. Generally, cryptocurrencies are issued in a unique way, known as mining. It stores all the transaction records on a block and encrypts them, proving this ledger is connected to the existing blockchain sequences. In other words, mining is adding a block containing new transaction records to the existing ledger, and when the new block is added, the user who made the block is rewarded with coins in return. While adding a new block, the hash value of the new block is calculated. For this to happen, a value called *nonce* is changed so that the header information of the block can meet a specific criterion. And this process requires an enormous amount of calculation, resulting in excessive consumption of electricity for feeding the hardware. Therefore, in a sense, the added value created by mining, could be called as the depreciation of the hardware used for mining and the usage of electricity. People thought the value of mined coins is larger than the invested value on mining, so that they participated in mining in order to earn coins. As a matter of Bitcoin, it adjusts the level of difficulty and eventually reduces the amount of coins mined to keep the value of coins by controlling its scarcity. When coins are no longer issued by mining, miners must solely rely on the transaction fees that come from verifying transactions. Thus, the system can only sustain when the value earned by transaction fees is not smaller than the value of effort for mining, keeping the creation of blocks going. Eventually, without resolving the current issue on PoW, the cryptocurrency system cannot be sustained.

'Hardware as a Mining Tool'?

In the early days of Bitcoin, high-performance CPU or GPU for parallel computation were mainly used to mine Bitcoins. However, in 2013, the Application Specific Integrated Circuit(ASIC) was developed, enhancing the mining efficiency more than 100 times

compared to before, leading the mining industry of Bitcoin. The smaller the amount of power consumed in the mining process, the larger the added value of the coins mined, resulting in the motivation of the coin miners. When the mining is concentrated to a few miners with many mining devices, it is against the idea of decentralization, and the risk for falsifying transaction records increases. In other words, selfish miners can form an alliance and take over the decentralized network, damaging other innocent miners. In 2013, the maximum mining capacity of the most extensive ASIC at that time, was roughly up to 2882 times better than that of the most extensive graphic card. And in 2016, the number was approximately 1051. The gap between mining capacities of GPU and ASIC has become narrow and the mining capacity of some GPUs is better than that of some ASICs.¹ Both the mining capacities for GPU and ASIC are steadily increasing as time goes by, but GPU seems to be developing faster than ASIC. But even though GPU is making faster progress than ASIC, the gap between the mining capacities is still over 1000 times, so the demand for ASIC is expected to be steady for quite some time.

Practical Difficulties in AI Researches

High Cost of Hardware

AI, currently used in industries, is a type of machine learning predicting results through repetitive training process conducted with numerous data. Machine learning works based on computing power for recursively calculating massive data. For AI development, a large amount of logical operations should be calculated simultaneously. GPU is the most suitable hardware to conduct them since it processes operations in a parallel way. For the development of ASIC, which is optimized for a specific calculation is also supporting the computation in AI researches. However, not only the cost of hardware is relatively high compared to the demand, and the demand in mining industry is also high, making it difficult and expensive for AI researchers to access such hardware. In fact, many researchers find hardware too expensive, thus using commercialized cloud services that charge the users depending on the usage time such as Amazon Web Service, Microsoft Azure, and Google Cloud Platform, but still a more effective way of providing computational resources is necessary.

¹ https://en.bitcoin.it/wiki/Non-specialized_hardware_comparison and https://en.bitcoin.it/wiki/Mining_hardware_comparison

Difficulty in Securing Quality Data

One of the real challenges in AI research is that it is difficult to obtain a large quantity of high-quality data. Even though it is not an easy task to collect a variety of data online, it is essential to examine that the collected data is in a format which the computer can process. In addition, quality data is likely to be used for a range of purposes rather than for intended ones. Therefore, increasing the reusability of data in versatile ways, will increase the value of the data. Therefore, will be a vital resource for the AI industry.

Difficulties in Developing and Embodying AI Models

Although new models of AI algorithm are continually being introduced to the academic society, it requires a large amount of data and embodiment of the model by using hardware to compute. To make the matters worse, even the publicly shared models are impossible to use without programming skills or the basic knowledge for programming language. Even though a certain proposed algorithm is embodied, if there aren't enough hardware resources to run a test or data to apply, realizing the idea itself would have limitations. AI industry would grow so much faster if embodied algorithm can be easily accessed, utilized, or improved. Therefore, the proper reward is given to those actions. In conclusion, if a new system that encompasses all factors needed for AI researches is introduced, we believe that the current problems in the AI research field can be resolved.

As a result, only a few IT companies takes all; they can acquire large amounts of expensive hardware, have easy access to high-quality data, and can invest in developing and improving new artificial intelligence models. If there is a platform that is faithful to the basic idea of blockchain that aims at decentralization by resisting monopoly, we believe that unlike current artificial intelligence industry which is monopolized by the few, we can make a future that many people can participate and develop together. In addition, if there are no restrictions on the number of individuals and various start-ups involved in artificial intelligence, this type of platform is self-sustaining and can have a substantial impact on the artificial intelligence industry.

Our Vision

Just Use of Resources

We present Neuron© AI Ecosystem, where computing hardware (GPU), quality data for learning, and models that can easily embody AI services are shared and consumed in a righteous way. The ultimate goal of Neuron© AI Ecosystem is the creation of values through using resources in a just way. We do not stand fiat value created through simple mining, using tremendous amount of hardware resources and electricity. We suggest a new ecosystem, where values can be shared rather than exclusively owned, supporting the field of AI industry. This is not for earning profits through speculative consumptions, it is rather a pioneer attempt to rightfully reward the members of the ecosystem for creating values earned through just use of resources. We trust in serving the mankind through supporting AI researches.

Necessity for an Impartial Ecosystem

Vitalik Buterin, the founder of Ethereum, said that although blockchain is inefficient, it has some advantages. The first one is the **copyright resistance**; there is no intervention by the government, Internet companies, etc. The second is about the **fraud resistance**, and the third is the **transparency**, that anyone can see all activities on the network. The fourth is the **robustness**, that is, even if there is a problem with the computer, it does not shut down. The last one is about the **interoperability** which means anyone can interact with programming. All these refer to the common idea of '**resistance to the monopoly**'.² At the moment, data, computing resources, and models needed for AI development and research are not shared, exclusively owned by some possessors or creators. However, when a system where resources can be used with proper cost exists, the creators or possessors can earn profit (reward) by providing those resources. Moreover, users can avoid wasting resources on the same operation and throw the resources into new purposes, accelerating the development of the AI industry. For this to happen, a decentralized ecosystem where resources are not monopolized, and values are fairly distributed, is necessary.

² Vitalik Buterin's keynote speech at Deconomy 2018 (Seoul, Korea, 4 April 2018)

Our Mission

Revolution in the NAI Ecosystem based on Blockchain

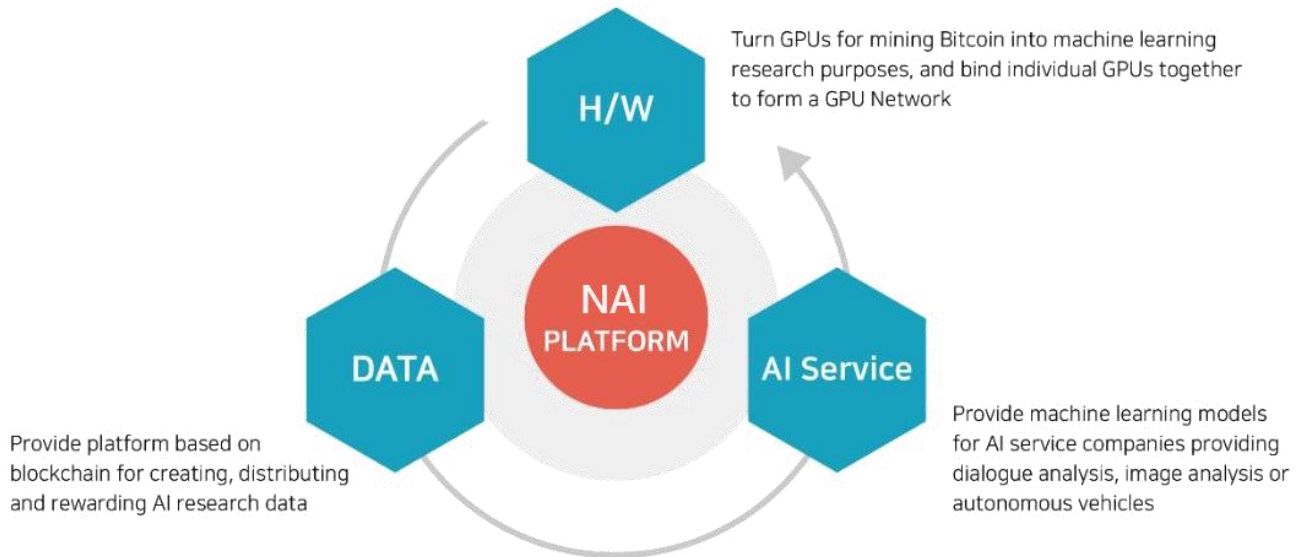


Figure 1. Revolution in the AI ecosystem based on blockchain that Neuron© AI Platform suggests

Conversion the Purpose of Mining Hardware

The GPU hardware resources of an individual are not 100% used. We are trying to create new ways of easily utilizing these idle resources of GPU computing power owned by individuals and the GPU resources, which are currently concentrated only on mining cryptocurrencies, in the field of AI industry. Value earned through sharing and utilizing GPU in the AI ecosystem is much larger than value earned through simple mining. Furthermore, it enables just and valuable consumption which serves the mankind by developing AI technology. For this to happen, rightful use of resources and sharing profit created from the increase of value, rather than declaratory phrases or sacrificial participation, is the key.

Necessity of Data Creation / Distribution / Compensation

We are launching a platform where members can acquire and provide data used for training models for AI algorithms. It makes it easier to acquire data by attracting voluntary

participation from the members, and enhances the reusability of data, thus accumulating and utilizing quality data used for a various range of purposes.

Providing AI Models

When AI researchers / developers provide algorithms or models, users will make proper payment in return. There will also be a section in the ecosystem, where data can be processed and improved, reducing waste of redundant efforts. The ecosystem will be vitalized not by a centralized system, but rather the system where individual members participate voluntarily, sharing created values, making a living ecosystem.

NRN Architecture: AI Ecosystem on Blockchain

NRN Platform Structure

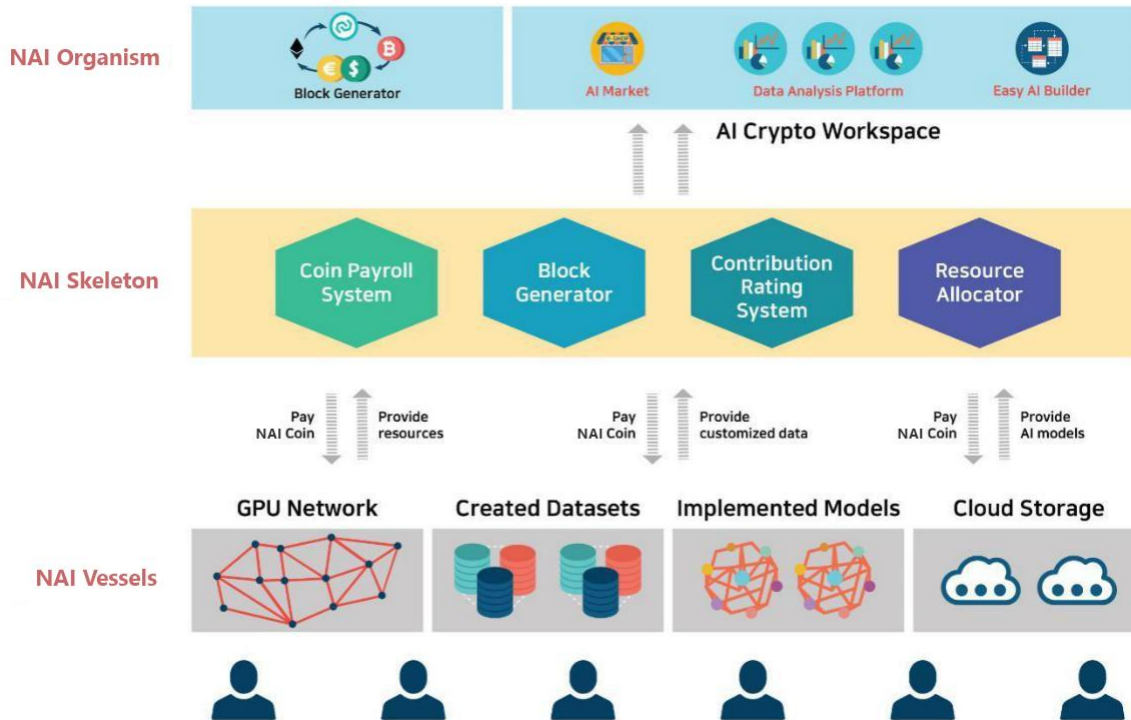


Figure 2. The Neuron© AI Platform is mainly consisted of Neuron© AI Vessels, Neuron© AI Skeleton, and Neuron© AI Organism.

Neuron© AI Vessels

The participants of Neuron© AI Ecosystem take part in the system by providing the main factors of AI such as hardware, data, and models in the stratum defined as *Neuron© AI Vessels*. Neuron© AI's hardware consists of a GPU Network for calculations and Decentralized Cloud Storage in order to save data. They provide the resources they possess and get coins as a fee from the resource users in return. At the same time, when the resources are proven worthy by other members of the ecosystem, the providers get additional rewards in the *Neuron© AI Skeleton* in accordance with the principle of **Proof of Value (PoV)**.

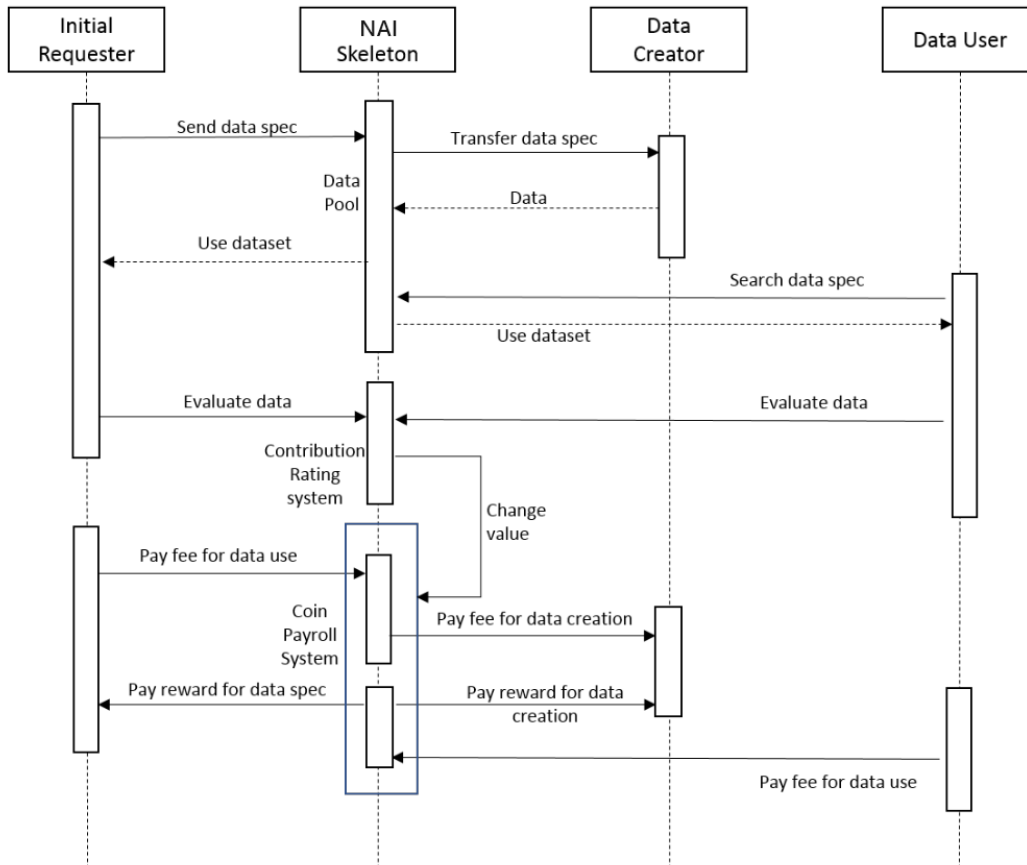


Figure 3. Neuron© AI Vessels is consisted of AI service (Model), data, and hardware, and each member participates by providing each resource.

Hardware Ecosystem (GPU)

This basically means sharing GPU resources. The individuals taking part in the Neuron[®] AI Ecosystem provides some portions of the computational capacity in their own GPU to the public network to supply resources needed for AI calculations, and get rewarded with NRN coins in return. The computational units distributed over the public network will be allocated to requested works by the *Resource Allocator* in *Neuron[®] AI Skeleton*. The collected fees for using the resources will be distributed by the *Contribution Rating System* provided in the *Vessels* to realize the philosophy of **Proof of Value (PoV)**.

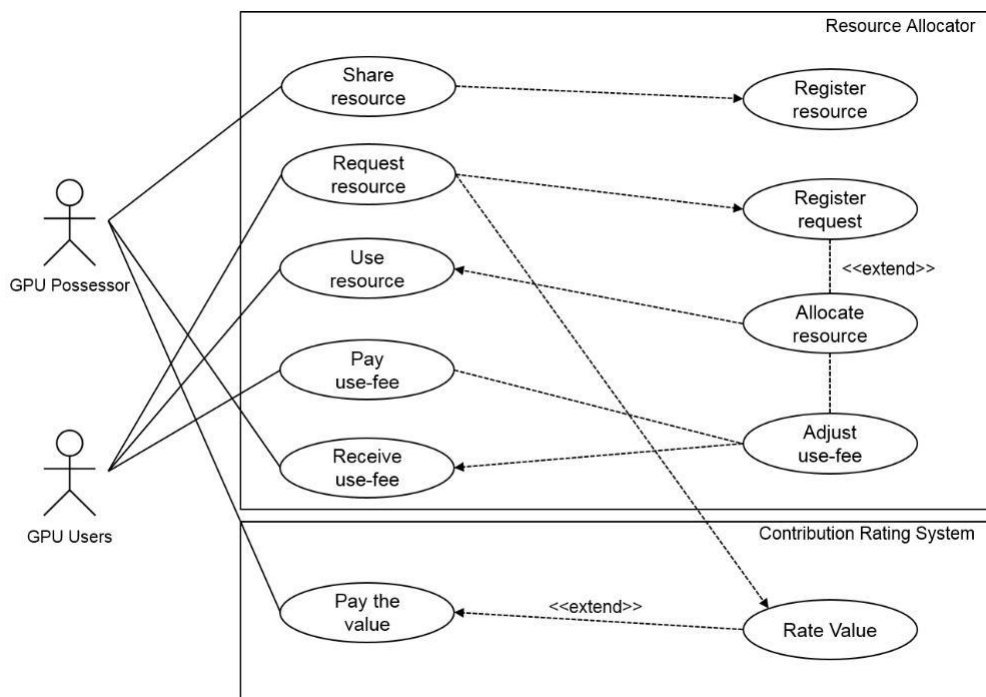


Figure 5. GPU possessors and users are the main members of the GPU Network. The distribution of resources is carried out by *Resource Allocator*, and the evaluation and rewarding are done by *Contribution Rating System*.

The hardware sharing system will be implemented based on a mixture of the Grid Computing system and the peer-to-peer (P2P) network, and each hardware participating in the network, the node, will be distributed with the maximum efficiency by the *Resource Allocator*. GPU resources required for machine learning operations form a computing grid on the network, and the data necessary for learning forms a data grid on the network.

Resource Allocator allocates each node participating in computing and collects data to be used as the input of computing from the nearest data grid. In terms of computing efficiency, theoretically, the most efficient case is that GPUs in a node utilize data within the same node. Also, each node that exists as an individual peer, collaborates preferentially with the closest nodes with short communication time. Therefore, the problem of communication inefficiency caused by decentralization, can be solved. In addition, the learning data registered in the data grid is not provided directly but is provided as simplified data that has been preprocessed. This reduces the burden on individual nodes in terms of security and efficiency.

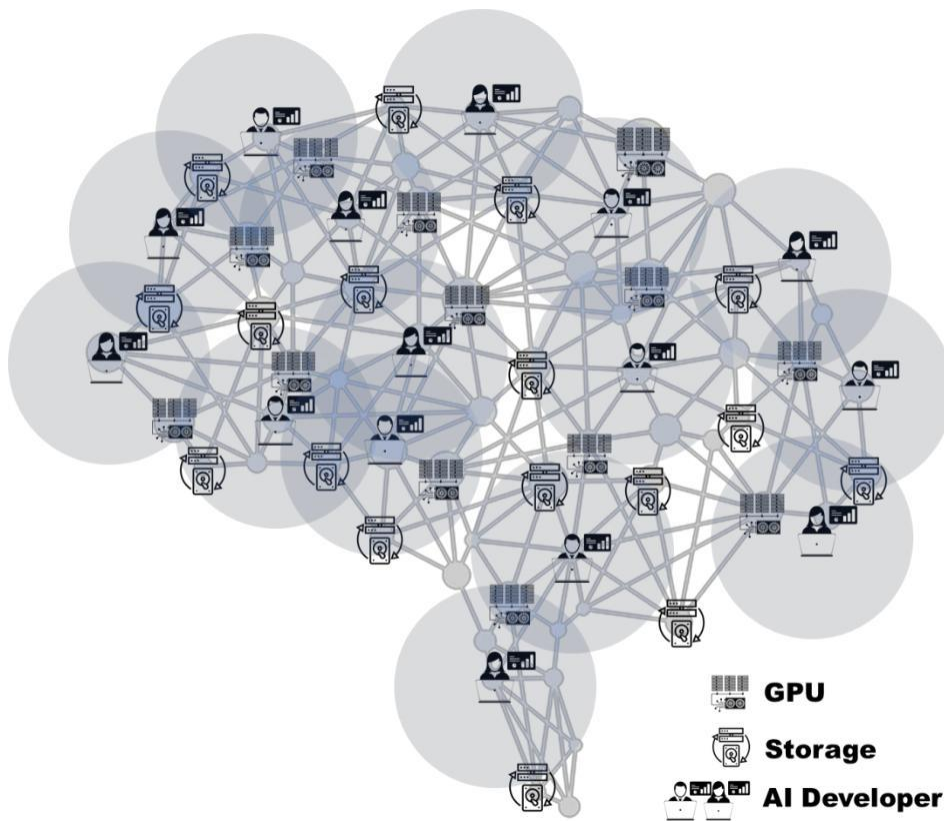


Figure 6. AI developers conduct model learning peer-to-peer, primarily using the closest GPU and storage resources.

It is also possible that a malicious participant would simply repeat the deep-learning computation, induce GPU resources, or produce false results regardless of the given task, to induce hardware traffic or otherwise. Therefore, a module will be included on the system to check whether the corresponding hardware node has done its job faithfully, through validation of the assigned work.

Shared Data Ecosystem (Dataset)

In the *Neuron© AI Ecosystem*, users can use some or the whole parts of shared dataset for free or by paying a fee. The fee is delivered to data providers as a reward and some are used as a commission for running the *Neuron© AI Skeleton*. The created data should meet the criteria of the initial requester and can later be provided to other users in need of that data, either for free or charged. If the created data is used frequently in *Neuron© AI Ecosystem*, resulting in the boost of *Neuron© AI Ecosystem's* consumption value, it is evaluated highly by *Contribution Rating System* in the *Neuron© AI Skeleton* and the provider will get rewarded with coins owned by *Neuron© AI Skeleton* according to the principle of PoV. If a malicious user in *Neuron© AI Ecosystem* requests meaningless data and tries to acquire coin by providing the data on one's own, the data that are not used by other members cannot generate any kind of profit and *Contribution Rating System* will give penalty once it detects fraudulent uses.

The creator who created valuable data that is widely used within the *Neuron© AI Ecosystem* should be rewarded appropriately. However, some malicious users may use the data outside of the Ecosystem to prevent legitimate reward allocation. Therefore, the data provided to Neuron© AI Ecosystem will be designed so that it can be used only within the Ecosystem, and it will be provided encryptedly in a way that defines the conditions of use so that data cannot be utilized outside the Ecosystem. In addition, considering the issue of privacy protection that is dependent on the data itself, such as the problem of non-identification of personalized data, the data distributed in the ecosystem can be directly used as an input data of artificial intelligence or machine learning model. It will also protect personal information and reduce network traffic. The raw data collected from the creator is stored in a separate space. To satisfy the needs of the data users who wants to check the quality of the raw data, a small number of data from the collected datasets can be previewed by random sampling. The reason why users do not see the full data is to prevent attempts to use the data without paying NRN.

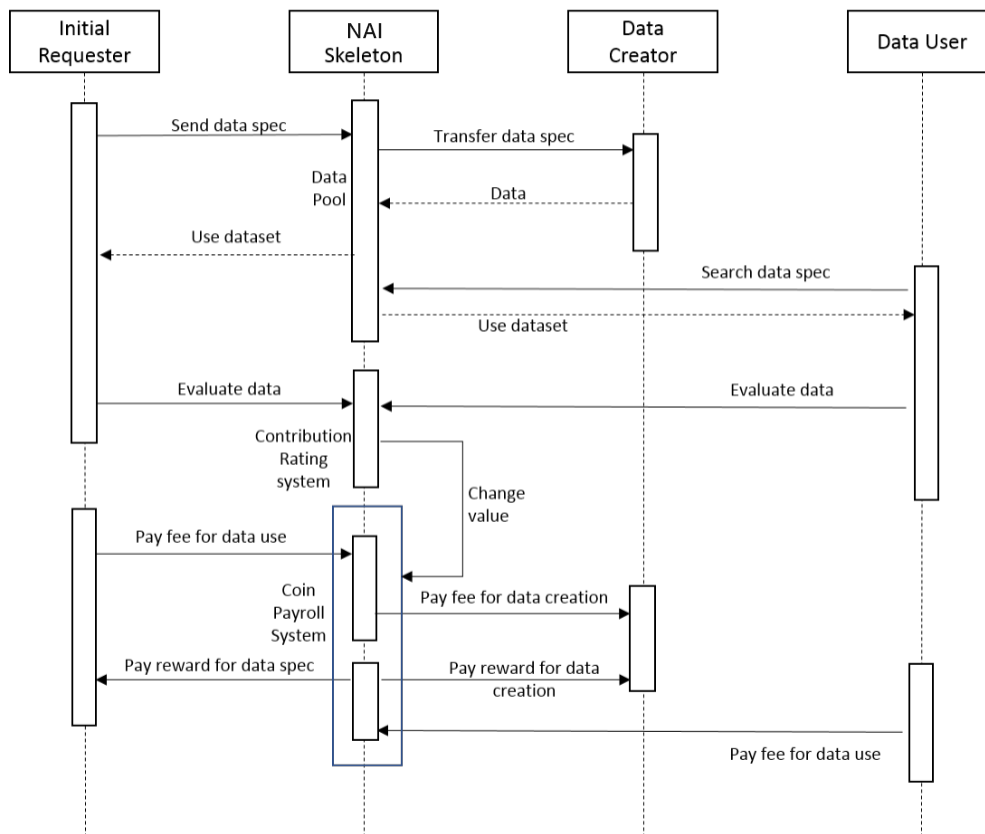


Figure 7. Shared data ecosystem is consisted of initial requesters, creators and users, and the distribution of resources and rewarding is conducted in the Neuron[®] AI Skeleton.

Cloud Storage Resources Ecosystem

It's impossible to save massive amounts of data from the Neuron[®] AI Ecosystem in one centralized storage center. Therefore, provided data needs to be saved through a Decentralized Cloud Storage system. Participants in the Neuron[®] AI Ecosystem can earn NRN coins by: providing storage space, sharing computing power for network connectivity, and participating in the actual data collection.

NRN Model Ecosystem

AI engineers can provide models that they designed through *Neuron[®] AI Vessels*, contributing to the *Neuron[®] AI Ecosystem*. The provided models will be compatible with the predetermined input / output format of data in *Neuron[®] AI Ecosystem* so that can be implemented in any programming language. The value of models provided in the *Neuron[®] AI Ecosystem* will be given in the form of reputation when they are used by other members in another layer called *Neuron[®] AI Organism*, and the developers will be properly rewarded by the principle of PoV.

Neuron© AI Skeleton

Resources such as GPU, Dataset, Storage Space and AI Models provided by individual members in the *Neuron© AI Vessel*, which circulate in the *Neuron© AI Skeleton*, helping to vitalize the *Neuron© AI Ecosystem*. Unlike the components of *Neuron© AI Vessels* which are physical, the *Neuron© AI Skeleton* exists distributed in the cloud. Conceptually, the *Neuron© AI Skeleton* is consisted of *Resource Allocator*, which distributes the resources of *Neuron© AI Vessels* and calculate fees, and *Contribution Rating System*, which evaluates the values of resources in the *Neuron© AI Ecosystem*. These factors are embodied via ERC20 Smart Contract. The distribution of profits created from the *Organisms* is also conducted through *Coin Payroll System*.

A block for recording transactions is created at the node of GPU network in the *Vessel* randomly selected on the *Block Generator* and is verified in the exact same way by other GPU nodes chosen randomly by the *Skeleton*. The block is generated in each training session of machine learning algorithm at the same time, and its header contains the information such as node ID, running algorithms, session ID, so that it prevents the attempt to create a block by false. The transaction verification block created as a result of machine learning, is added to the blockchain when the *nonce* is adjusted according to the block creation cycle, and when the block meets certain conditions. At this time, the owner of each node that participates in the *Vessels* and provides the GPU resources cannot know the creation of the block until the new block is added to the chain. Each members of the *Vessels* cannot recognize whether a part of one's node participated in creating or verifying blocks or not, therefore getting rid of the possibility of verifying malicious transactions. Each block will be created every 2 seconds in the early stage of the *Neuron© AI Ecosystem* and will be changed as the number of transactions and the participating GPU Nodes increases.

Neuron[©] AI Organism

Neuron[©] AI Team suggests a new alliance called the *AI Society*, consisted of deep-learning researchers and experts, and start-up workers in all related fields. *AI Society* will help vitalize *Neuron[©] AI Ecosystem* and boost the development of AI. Members of *AI Society* can participate as hardware providers, or data and / or model creators in *Neuron[©] AI Vessels*, contributing to *Neuron[©] AI Ecosystem*. Or they can participate as users in *Neuron[©] AI Organism*. For example, the owner of an Internet cafe can take part in the Ecosystem as a member of the *Vessel* by providing computer resources that are not in use. Also, AI researchers at universities can train models and develop them using the resources within *Neuron[©] AI Ecosystem*. Then they can provide the models to corporations of the field. And start-up workers in the related field can use the AI service in the *Organism* to create new products and sell them. All these activities will contribute to the development of AI. In order for this to happen, the Neuron[©] AI Team would put fair amount of effort in building the initial *Society* and providing the community where members can interact with each other. Neuron[©] AI Team creates an alliance consisted of AI start-ups and developers as a first step to build *AI Society*. The Neuron[©] AI Team would do our best for the members to use *AI Society* without facing any problem. The *Neuron[©] AI Ecosystem* supported by *AI Society* gives rewards to the members for creating proper values as the result for actions in the *Skeleton*. For example, users outside the *Ecosystem* can launch their own AI service through easily combining various components within the *Ecosystem* on GUI through using the *Easy AI Builder*. Users outside the Ecosystem can share the benefits of the services with other suppliers of components in the *Vessels*. The created components can be traded in *AI PLAZA*, enabling all members in the *Ecosystem* to contribute utilizing the AI technology and make profit out of it. For special purposes, it can provide a *Competition Platform* for analyzing data, such as Kaggle, so that many people would be able to design the best AI model or find an appropriate format using the same dataset. In such ways, AI products created within *Neuron[©] AI Ecosystem* contribute to the society through the *Neuron[©] AI Organism*, also enhancing the value of *Neuron[©] AI Ecosystem*.

The Key Technologies of Neuron[®] AI

Summary of Key Technologies

This section explains the details on key technologies of Neuron[®] AI, which include the AI Deep Learning module to solve the pain points of AI models, AI training data and AI Mining module to solve the inefficient utilization of scarce AI hardware resource. The AI Ecosystem module creates an ingenious token ecosystem that motivates every participant in AI Deep Learning and AI Mining, to utilize and allocate AI resources in a more efficient and innovative way. This solves or remits the three major issues in the promotion of AI technology as identified by Neuron[®] AI. As shown in Figure 8, AI Mining, AI Deep Learning and AI Ecosystem jointly build the key technical framework of Neuron[®] AI.

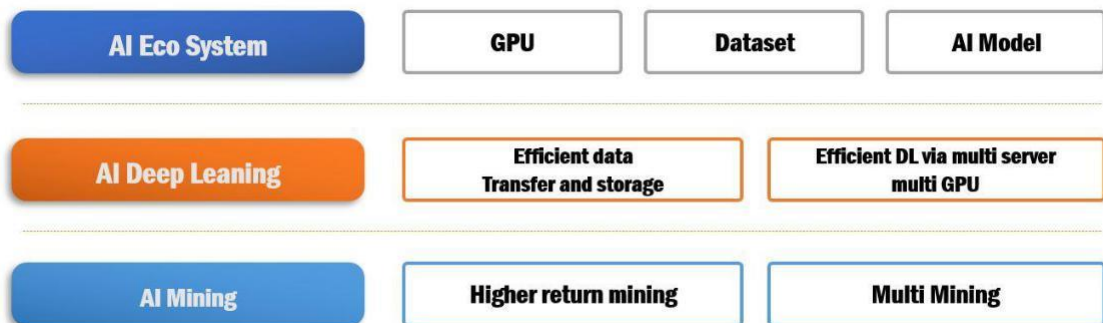


Figure 8. Key technology framework of Neuron[®] AI

In addition, for the technical solutions to custom Ethereum virtual machine and smart contract expansion design, we will focus on cutting-edge technology development (blockchain 3.0) in the subsequent R&D to develop favourable public chain in the future, that will bring a feasible solution for the encryption design for sensitive training data.

Artificial Intelligence in Finance



Artificial Intelligence is taking the financial services industry by storm. Almost every company in the financial technology sector has already started using AI to save time, reduce costs, and add value.

For example, robo-advisor Wealthfront tracks account activity using AI capabilities to analyze and understand how account holders spend, invest, and make financial decisions, so they can customize the advice they give their customers.

Funders are taking notice

In January, CB Insights reported that 2016 was a record year for AI venture funding deals. With 550 companies using AI in their products raising \$5 billion. In July, CB Insights announced a list of 250 companies that are poised to redefine the financial services industry. At the 2016 Annual Technology Innovation Summit, hosted by Bank of America and Merrill-Lynch in Silicon Valley, AI, robotics, and VR were named as the most interesting area in technology for the coming year.

The seven leading U.S. commercial banks have prioritized strategic technological advancement by investing in AI applications to better serve their customers, improve performance, and increase revenue. For example, JPMorgan Chase's Contract Intelligence (COiN) platform uses image recognition software to analyze legal documents and extract important data points and clauses in seconds, compared to the **360,000 hours** it takes to manually review 12,000 annual commercial credit agreements.



Wells Fargo began piloting an AI-driven chatbot that communicates with users to provide account information and helps customers reset their passwords through Facebook Messenger in April 2017. And Bank of America reported a \$3 billion innovation budget in 2016.

The future of finance will be heavily influenced by emerging fintech companies and AI technology applications setting the stage for increasing competitiveness among the industry's leading giants. In the next decade, Artificial Intelligence will help financial services companies maximize resources, decrease risk, and generate more revenue, in the trading, investing, banking, lending, and fintech verticals.

Maximizing Resources

Artificial Intelligence helps companies in the financial industry save time and money through the use of algorithms to generate insights, improve customer service, and make predictions about company sales performance and churn.

Unlocking the value of AI algorithms

Automation, which has been used in factory processes for decades, is about replacing repetitive tasks with machines: Software has automated tasks, like matching data records, looking for exceptions, and making calculations. Artificial Intelligence, on the other hand, is about replacing human decision-making with more sophisticated technologies—AI is built to learn continually and improve over time. To unlock the value of AI algorithms,

companies need access to large data sets, must apply data processing power, and interpret results strategically.

AI handles three types of data exceptionally well:

parameters and numbers, generating insights beyond human accuracy

analyzing, interpreting, and writing **text**, using context-aware natural language processing with AI, with near-human accuracy

images (spotting patterns, object/human/face recognition, scene understanding, activity detection, and automatic equipment audit/inspection beyond human accuracy), using deep learning methods for computer vision.

Filtering information and analyzing sentiment

AI helps humans work more effectively by filtering key information from a wide variety of sources. For example, AlphaSense's sophisticated search functionality leverages natural language processing to find and track relevant information in search, learning from successes and mistakes with each search. Reuters News Tracer filters tweets through Machine Learning algorithms to pick up on breaking news before it's reported elsewhere. Likewise, financial services companies can use AI to detect brand sentiment from social media and text data, measure it, and transform it into actionable advice. Sentiment analysis assists with advanced classification of textual data (e.g., for compliance). These would be relatively novel applications of artificial intelligence, particularly in the arena of finance.

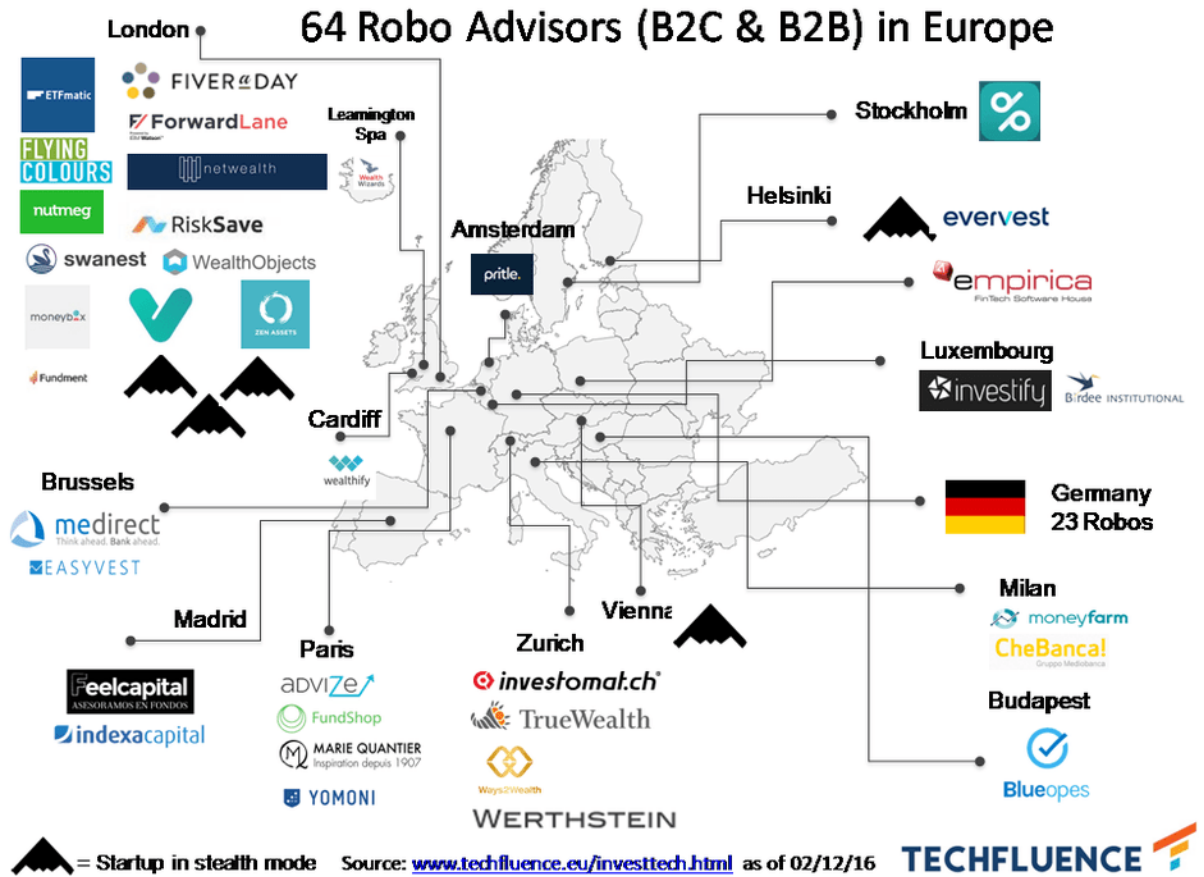
Trading: Better trading through algorithms

AI can help manage and augment rules and trading decisions, helping process the data and creating the algorithms managing trading rules. Investment firms have implemented trading algorithms based on sentiment and insights from social media and other public data sources for years. Hong Kong-based Aiyda uses algorithms to conduct trades autonomously, and some companies, like Japan-based Nomura Securities, relies on AI robo-traders for high-frequency trading, to boost profits.

Investing: Fintech companies offer investment insights

In the wealth management arena, B2C robo-advisors augment portfolio management and rebalancing decisions made by humans, often analyzing a person's portfolio, risk tolerance, and previous investment decisions to offer advice. Kensho's intelligence-grade database provides traders with information on market trends around the globe, and ForwardLane provides financial advisors with personalized investment advice and quantitative modeling that used to only be available to extremely wealthy clients, using AI

powered by IBM's Watson. As mentioned earlier, Wealthfront uses AI to track account activity and help financial advisors customize the guidance they give investors.



Banking: AI enhances efficiency, offers data insights, and manages risk

Chatbots help banks serve customers more efficiently, even though they aren't advanced enough to handle support cases autonomously. Powered by natural language processing, bots can listen in on agents' calls, provide accurate answers quickly, and suggest best practice answers to improve sales effectiveness. Neural networks help agents respond to common customer service queries by sorting and labeling metadata and generating three potential responses, each with a level of certainty attached.

As we mentioned earlier, we're already seeing banks like Wells Fargo using chatbots to improve the customer experience and reduce time and cost. Many of these virtual assistants use predictive analytics and cognitive technologies to personalize customer support, accessing a user's financial portfolio, banking history, and goals, to automate trades and give advice. Predictive analytics are able to leverage a company's customer base for churn prediction, advanced revenue prediction, and sales forecasting.

Financial firms take advantage of AI to identify the clients most likely to leave a bank or advisor. Finn.ai's white label chatbot integrates into existing messaging platforms, as well as a bank's web chat interface.

If a financial firm's data is unstructured, or the company has many databases that store information about entities separately, it's difficult to link and connect information. An army of human analysts used to be required for such projects, but now, it can be done via AI, with minor human supervision.

Lending: AI for credit lending

Machine Learning is a game-changing technology for lenders, lowering compliance and regulatory costs and helping with robust credit scoring and lending applications. Credit decision makers can use AI for robust credit lending applications to achieve faster, more accurate risk assessment, using machine intelligence to factor in the character and capacity of applicants. For example, underwrite.ai applies advances in AI derived from genomics and particle physics to provide lenders with nonlinear, dynamic models of credit risk which radically outperform traditional approaches. This can supplement young adults' and self-employed professionals' often thin credit history. In fact, FICO uses AI, to build credit risk models. AI can also help creditors collect outstanding debts, by using Machine Learning to generate insights that are hard for humans to spot.

Fraud detection

A 2015 study by the research firm Javelin Strategy found that false positives—legitimate transactions that are wrongly rejected, due to suspected fraud—account for **\$118 billions of dollars in annual losses for retailers**, not to mention lost customers, who will often abandon the issuer of the erroneous decline. Machine Learning algorithms, like those used by Mastercard's Decision Intelligence technology analyze various data points to identify fraudulent transactions that human analysts might miss, while improving real-time approval accuracy and reducing false declines. Using Machine Learning to spot unusual patterns and improve general regulatory compliance workflows helps financial organizations be more efficient and accurate in their processes.

A New Frontier: How AI is Shaping Forex Trading

In February 2019, US President Donald Trump signed the official order for the American AI Initiative. The initiative aims to ensure “American leadership in Artificial Intelligence”, as paramount to “maintaining the economic and national security of the United States”. Despite emerging only in the 1950s, artificial intelligence is already changing the ways countries expand their financial, business and defence systems. The price tag on this ‘technology of a generation’ is growing at an exponential rate: in 2018, AI had a projected value of \$1.2 trillion, and in 2022 it is expected to be valued at \$3.9 trillion.

As the AI sphere expands, so does the world of online forex trading. The first online forex trading platform was launched in 1996, and enabled the first generation of online retail traders to participate in the largest market in the world. Twenty years after the first online trading platform, and retail forex trading represents \$282 billion of daily turnover.

In 2018, the two advancing technologies came together to create a new forex trading experience for users. It’s clear that the next frontier for forex trading will be the integration of AI – but how exactly will this impact trading in 2019? In this article, **FXTM will take a look at the ways AI is being implemented to improve a trader’s experience.**

Customized trading experience

In 2018, forex brokers started to put a lot of emphasis on mobile trading. Most brokers had their own purpose-built mobile apps developed, like the FXTM Trader App, which allows traders to open positions, deposit and withdraw, and track profit potential from their phones. However, the sheer number of mobile trading apps released last year meant it was difficult for traders to decide and distinguish between various apps’ capabilities.

AI has the potential to set brokers apart in the field of mobile trading. FXTM recognise AI’s ability to transform the world of mobile trading and have started to explore ways it could enhance their products and services. From personalised trade analysis to assisted education, AI is set to change the ways users interact with their mobile trading app.

New predictive analytics

Forex trading firms are also continuing to research AI’s ability to predict fluctuations in the forex market. Japanese enterprise Nikkei recently used AI to predict Dollar-Yen exchange rates. The software predicted the value of USDJPY in a month’s time, and this prediction was compared against the company’s top analysts. The AI predicted a value which was 0.05 away from the correct value, beating the company’s top analyst, whose prediction was off

by 0.6 from the correct value. The AI used natural language processing and vast amounts of data from the company's articles, trends, commodity prices and market indicators.

A similar study by I Know First found that an AI predicted the correct values 77.75 per cent of the time over a 7 day period. AI algorithms can inform short-term strategies with real-time data – something which is particularly valuable for traders who use scalping. However, it's worthwhile to note that the forex industry is just at the beginning of its journey with artificial intelligence. This means that the ability of AI to inform trading is still very much underdeveloped.

Potential for lessened risk

Last but certainly not least when it comes to the forex industry, **artificial intelligence has the possibility to reduce overall risk**. Automated stop loss orders, which have become commonplace in the trading world, sell off assets once they fall below a certain price. With these in place, traders' emotions are less likely to sway sell-off decisions.

The broader applications of AI in forex trading are likely to produce similar results. Traders' decisions can be effected by many variables, including political news, fear, fake news and more. By using AI to help inform their trading decisions, traders can formulate an idea of what the markets might look like without added volatility from outside factors.

As it stands, even though it's still in the development stage, **AI looks set to revolutionise online trading experiences in 2019 and beyond**. It has the potential to create tailored, client-centric user journeys, informing decisions with improved predictive analytics and potentially decrease the impact of emotions on trading decisions.

How AI and Automation Can Help Crypto Investors Trade Better

Millions of new users entered the crypto space in 2017 during this ICO boom. However, despite its rapid rise in popularity, investing in cryptocurrencies isn't without technical difficulty. Now, Artificial Intelligence will be an integral factor in cryptocurrencies investing.



Hundreds of new cryptocurrencies have been created and offered to investors through initial coin offerings (ICOs) over the past year. Millions of new users entered the crypto space in 2017 during this ICO boom. More are jumping on the bandwagon this year.

However, despite its rapid rise in popularity, investing in cryptocurrencies isn't without technical difficulty. Most people who've heard of cryptocurrencies – and many who have put money into it – only have a vague understanding of how these work as investment vehicles. Confusion among new investors has been high due to the abundance of coins and their fluctuating valuations.

Cryptocurrencies are highly volatile. It's become common to hear stories of investors who entered the crypto market during the boom, only to panic sell when prices suddenly dropped. Even seasoned traders are, at times, influenced by their emotions. It can be hard for traders to ignore the stream of Wall Street bigwigs and government officials expressing their lack of faith in cryptocurrencies when the markets echo their statements.

Navigating crypto investing takes plenty of skill and know-how. Fortunately, there are also some powerful tech-driven tools that could help both fledgling and experienced traders make sense of the wild crypto market. Artificial intelligence (AI) are now finding their way into crypto activities and even creating synergies with blockchain technology to help address these concerns. Ventures like Endor and Signals are all embarking on projects that can potentially impact crypto investing in major ways.

Lower Barriers to Predictions

It is important to understand how AI fits in the context of crypto investing. According to Endor CEO and Co-Founder Dr. Yaniv Altshuler, by using AI, an investor or analyst “can take past-data, let’s say, the price of an asset at each day during the past year, and all of the places and times it was mentioned in social networks and use mathematical tools in order to produce a prediction regarding whatever it is we are interested to predict the asset’s price a month from now.”

Doing such an analysis without AI is tedious and impractical. However, the tools and expertise necessary to analyze such data are only typically available to large enterprises who have the resources to invest. Accurate predictions do not come cheap.

“The quality of the prediction depends on the quantity and quality of the data, the quality and sophistication of the mathematical models used, and with some extent also to the amount of computation power that can be dedicated to solving this problem,” Dr. Altshuler says.

There have already been significant developments in this area. For instance, Endor has successfully worked with several large enterprises in analyzing behavioral patterns in big data. The firm, an MIT spinoff, uses social physics or the use of physics-inspired tools to analyze behavior in human-driven events. It has successfully developed what they call the “Google” of predictive analytics – an AI-driven technology that allows users to simply enter questions and quickly get accurate predictions.

The company is now moving into the crypto space through its Endor.com Protocol – a blockchain protocol that makes predictive analytics accessible to ordinary users. Using a token economy, the protocol encourages participation of data owners and developers who could contribute to improving the system. By tapping the shared expertise and custodianship of crowds, this ecosystem ultimately makes tools and predictions more affordable.

Endor is also able to analyze blockchain data to generate predictions. Behavioral patterns from blockchain transactions could help make sense of the factors that drive the highly-speculative crypto market. Using the protocol, investors will be able to readily spend Endor’s

EDR tokens to pay for predictions without having to learn advanced data sciences or invest in big data infrastructure.

Monetizable Insights

Signals is a marketplace for trading strategies. It aims to establish a comprehensive ecosystem that enables crypto traders to make critical decisions informed by hard data. The platform can also be used as a means for data scientists to monetize their insights. By creating and selling indicators and signals crypto traders are able to optimize their profits.

Like Endor's protocol, Signals' platform has been developed so that its users do not need to have high levels of technical expertise or extensive programming knowledge. The platform uses AI to combine various trading models in order to make them easier to use. Instead, the algorithms used in market indicators on the Signals platform are assembled and optimized through easily-understandable visual media.

Signals are also developing tools for integrating external data into its network. Signals plan to incorporate platforms that can be used to create prediction markets into its own system. Prediction markets rely on crowd-sourced wisdom to predict the futures of events including financial markets. Having such monetization mechanisms available incentivizes data scientists and savvy investors to share their market predictions with ordinary investors.

Pavel Nemecek Signals CEO and Co-Founder says, "There is a large amount of extremely bright people in the data science and crypto trader communities who are not working for Wall Street hedge funds and don't have access to the necessary infrastructure, resource, and data to train their trading models. We are creating an environment where they will have all of that and more including machine learning-based indicators, data from blockchain-based prediction markets, media monitoring and sentiment analysis, blockchain monitoring to detect the activity of whales, and so on.

Interoperability and Automation

These prediction and analytical tools help investors make the most informed trading decisions. What could further bolster this, however, are better interoperability among blockchain platforms and automation.

There are now efforts that promote interoperability and data exchange not only across blockchains but with traditional centralized institutions as well. Blockchains currently cannot transact with each other out-of-the-box, limiting trading tokens to crypto exchanges. Because of this, real-world adoption of cryptocurrencies for day-to-day financial transactions has been limited.

Combined with AI-driven services, the interconnectedness of blockchains could allow for the creation of apps that can automatically execute trades based on a multiple of market

factors and not just the events concerning one blockchain or cryptocurrency. Investors will be able to take advantage of automation rather than having to constantly monitor all these factors in order to time the market right.

Better Insights and Trading Strategies

Transactional data are also currently limited to each blockchain. While tools such as Endor can be used to analyze blockchain data, insights would only be based on trading and behavioral patterns for one cryptocurrency. Data from cross-chain platforms can reflect how blockchain and cryptocurrencies relate to wider aspects of finance. This has the potential to reveal more complex patterns and yield richer insights when analyzed.

Other forms of interoperability could benefit the space. Data scientists and other experts who have built indicators and trading bots outside of the Signals platform can integrate their creations with application programming interfaces or APIS. This could lead to interesting mashups and diverse functionalities.

Wider interoperability across blockchains eventually creates richer sources of data from which AI can learn and generate insights. This helps traders create more informed and calculated strategies. Used alongside automation and cross-chain platforms, these could also help minimize the impact of volatility and speculation for traders.

AI Deep Learning

AI Deep Learning is a major direction for future technology development and has very large economic market potential.

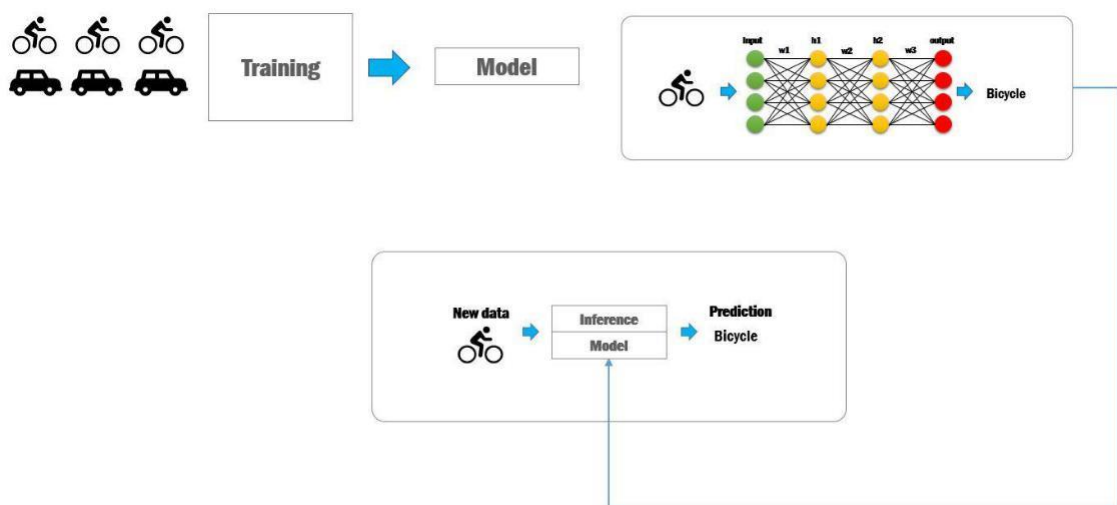


Figure 9. What Deep Learning do: Self Learning and prediction

In order to achieve accurate AI awareness during AI deep learning, multi-layers of iterative calculations are required. See the following Figure 10 for more information. For

example, as we all know to defeat the international chess king, the AI of Google AlphaGo must form an accurate strategy with multiple levels of iterative calculations. However, repetitive calculations require a lot of computing power and calculation time. So if you can solve these two problems, you can help develop AI deep learning.

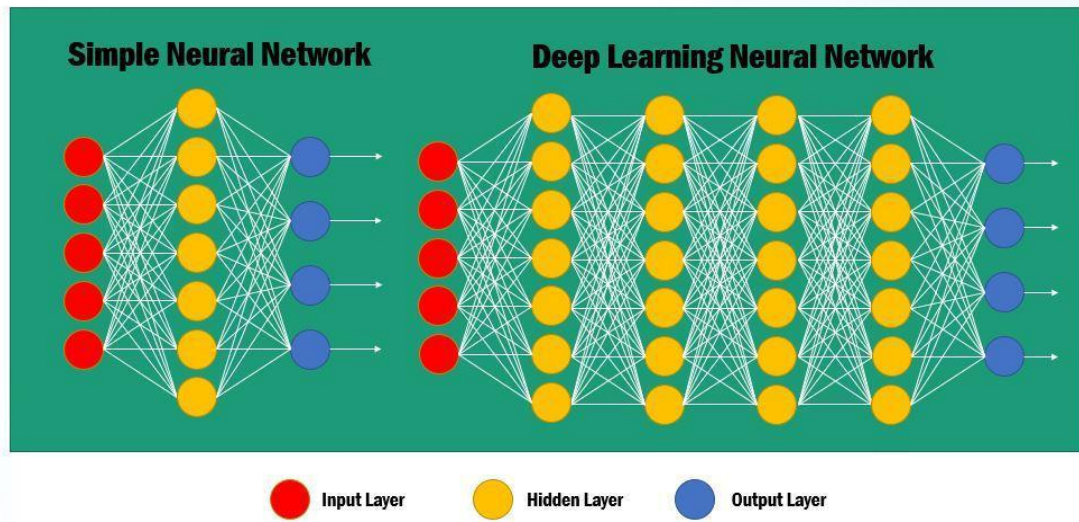


Figure 10. Multi layers Computations: requires huge amount of computing power

When interpreted as a mathematical formula, “multi-layer” is more than one layer, and the more layers, the more complicated the iterative calculation, the more accurate it is.

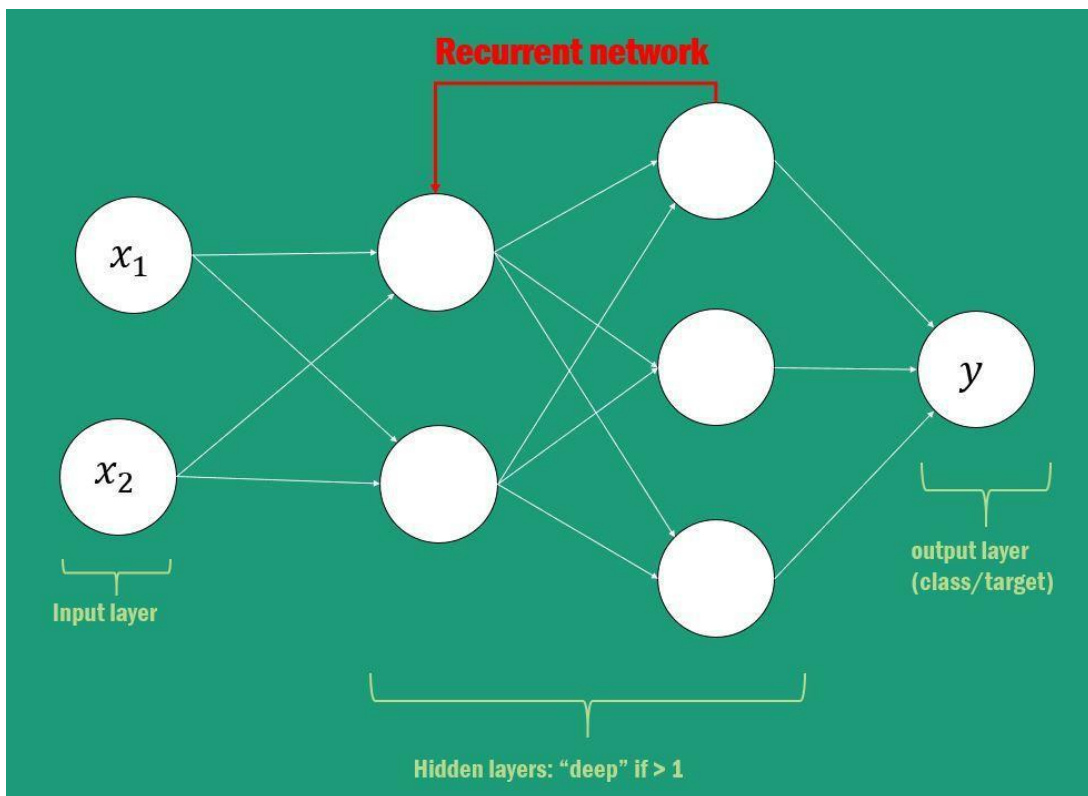


Figure 11. Multi layers Computations

Standardized Deep Learning Model

Due to the complexity of AI models, they often make it hard for model consumers to understand, due to the different machine learning algorithms, diversity of AI model contributors' coding methods as well as machine deep learning models. Meanwhile, it also creates difficulty to evaluate the models' real effects. Hence, the corresponding model standardization rules (Distributed GPU Deep Learning Standardization) need to be set such as calling interface definition, parameter configuration and operating environment description, etc.

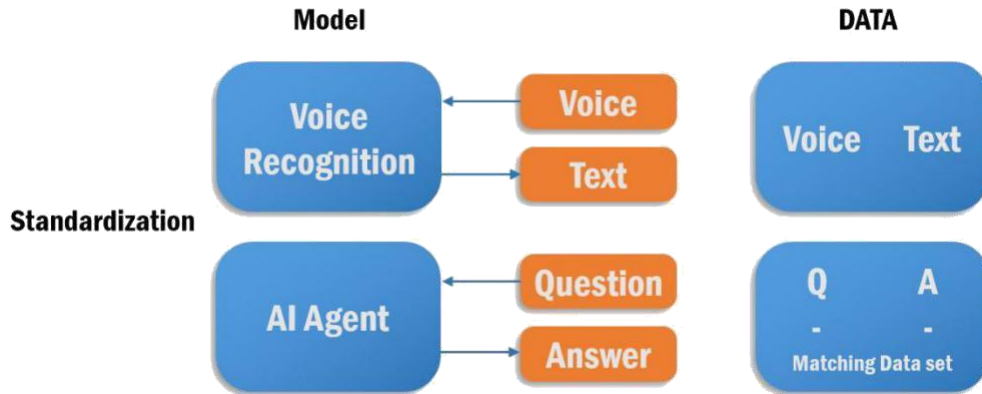


Figure 12. Example of standardization of application scenarios for deep learning models

Taking voice recognition and deep text matching (Q&A) as examples, Figure 9 briefly illustrates a sample of model standardization. The model contributors need to provide the descriptions of the training data input format for different application scenarios, so that the model can quickly verify the comparable application effects when solving real case scenarios.

Digitizing AI Data: More efficient transport and storage

The AI training data set in real case scenarios is often massive and requires large amounts of memory for in-depth calculations. This makes it inefficient to process deep runs and computation by sending large data sets in a distributed environment. The common solution is to read into memory in batches, which, however, will inevitably affect the operation efficiency. Starting with the intermediate process of numerical operations, as shown in figure 2.2, we plan to solve the bandwidth problem by pre-processing the actual data required for deep computing and sending it in the form of digitized data. At the same time, we will also consider the use of caching mechanism to improve operation efficiency to save cost.

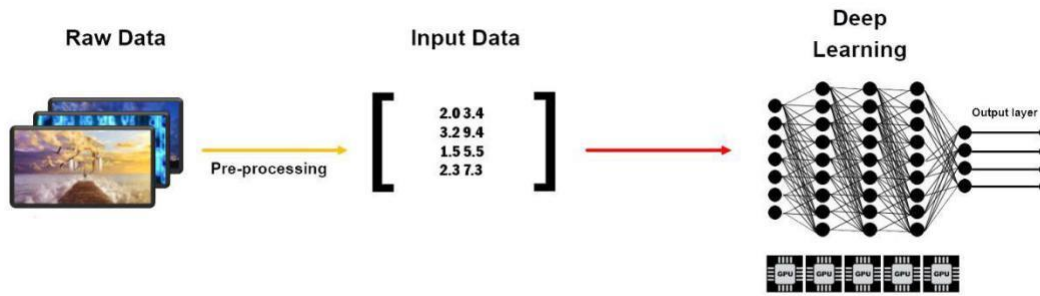


Figure13. Example of digitization of application scenarios for deep learning training data

NRN Mining

As mentioned above, the scarcity of deep learning hardware devices makes the cost high. This is because such resources are often concentrated in the hands of a few institutions. To promote fairness and eliminate efficiency issues when using deep learning resources, Neuron© AI plans to bring together as much temporary idling mining equipment (such as GPUs) as possible to form a hardware pool for deep learning sharing platforms. These devices, such as GPUs, FPGAs, ASICs, and DSPs, can be owned by either individuals or institutions (such as mining farms). Devices of different types and performances will connect with our platform in accordance with our defined common standard interfaces. Also, we will provide customized solutions for mining farms or other large and concentrated resource contributors. This provide high quality services and stable performance requirements for resource consumers. The application of blockchain technology not only solves the inequal spatial distribution of AI hardware resources, but also enables us to further integrate other technologies to optimize resource application efficiency.

The following are two key innovative technologies that we focus on to develop hardware configurations and software deployment solutions to maximize the utilization of resources. This effectively address the inequalities in the distribution of AI hardware resources, improving efficiency and creating greater value for the participants of NRN token ecosystem.

Multitasking Real-Time Switching

The Neuron© AI sharing platform integrates the hardware resources of the AI device contributors to build a deep learning hardware pool. Through the resource scheduling, isolation & distribution system of Neuron© AI, AI resource consumers, especially deep learning hardware consumers, will be able to use the scarce resources at more reasonable prices (lower than the GPU service fee of current mainstream cloud service providers). Also, consumers who bought long-term right to use learning hardware often have a lot of fragmentary time and do not need to perform deep learning computing. This makes multitasking real-time switching necessary.

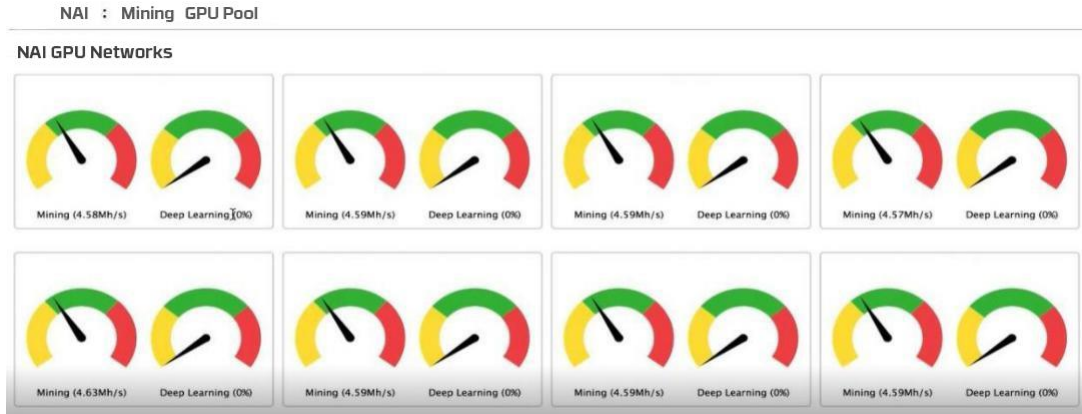


Figure18. Concept map of real-time monitoring and automatic switching between mining and deep learning

As shown in Figure 18, we developed a real-time monitoring system for deep learning hardware resources. Once the system is turned on, it can automatically switch from the current task to other tasks, such as switching between deep learning algorithm operation and cryptocurrency mining operation. This function will be monitoring in real time and automatically switch tasks, which can effectively solve the time imbalance of AI hardware resources.

Optimization of Mining Efficiency

The key to mining is to demonstrate the strength of hashing power through hash operation to obtain greater opportunity to create the blocks. Assuming the performance of the hardware devices is consistent, it will be a theoretically considerable direction to achieve a breakthrough in POW through software innovations. As shown in Figure 3.2, based on this idea, we developed the "Crypto + AI Mining" solution, which uses deep learning algorithms to optimize the hash function and further accelerate the hashing effect. Hence, under the same equipment conditions, this effectively increase the efficiency of AI hardware resources and help miners to obtain mining revenues at a faster rate.

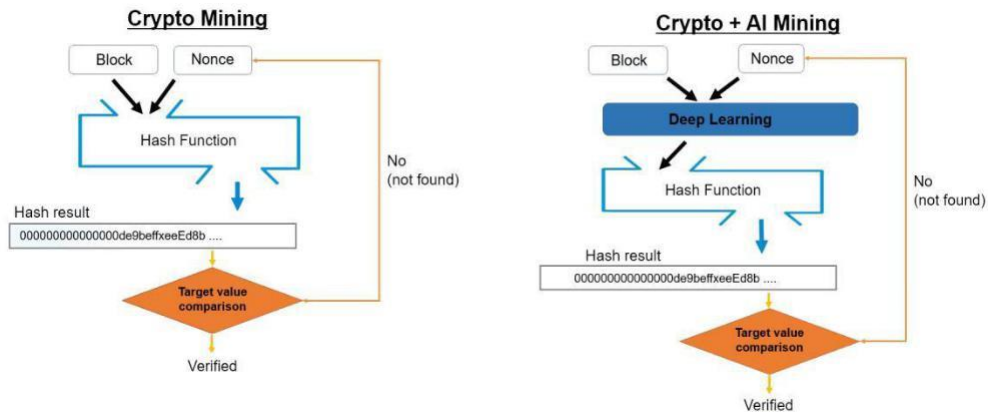


Figure19. Efficiency comparison between traditional mining and AI Mining mining

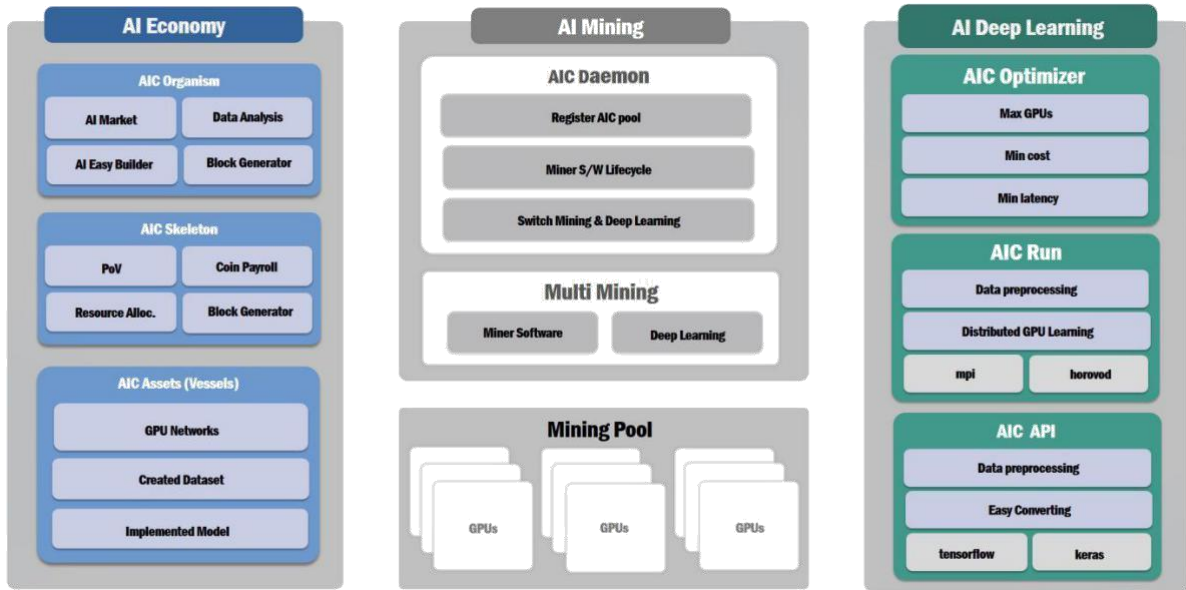


Figure 20. Neuron© AI Architecture

Market Overview of AI Deep Learning

The Market for AI Deep Learning is huge, attracting international companies such as Amazon, Google and Facebook.



Figure14. Trend in AI Deep Learning: Billions dollar market size and growing exponentially

As you can see in the Figure 15 below, Google’s AI Deep Learning business has been growing exponentially in recent years. Google is a leader in software, proving the evolution of the AI Deep Learning market.

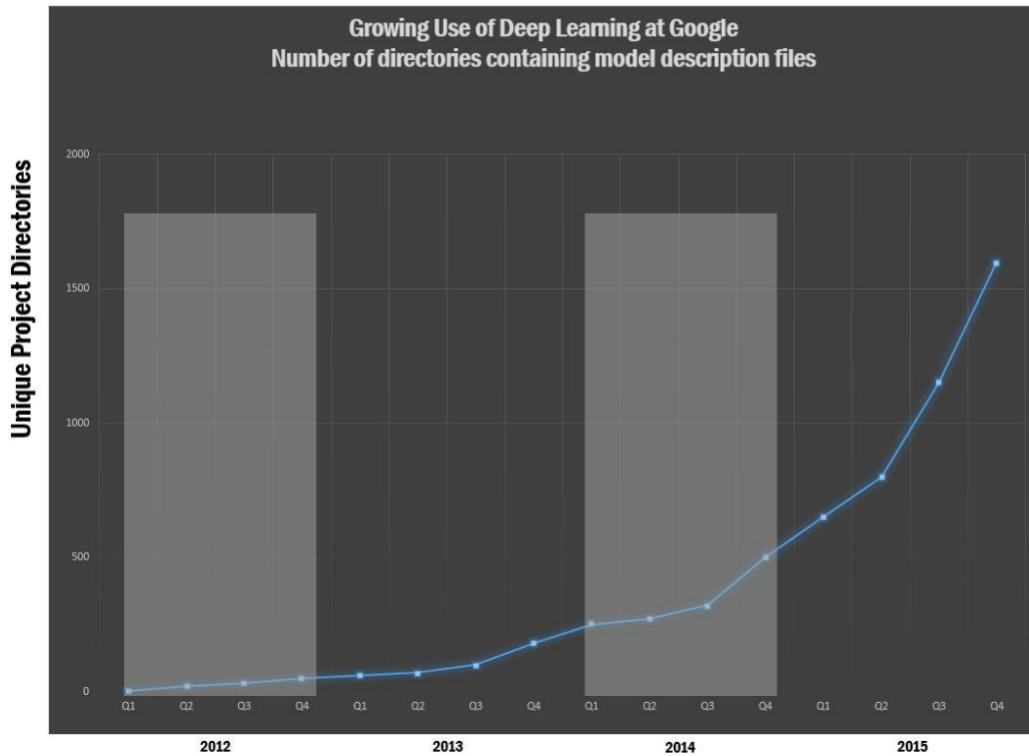


Figure15. Trend Growing Use of Deep Learning at Google

NVIDIA’s AI Deep Learning business has grown exponentially in recent years. NVIDIA is a giant in the GPU industry, proving once again the evolution of the AI deep learning market.

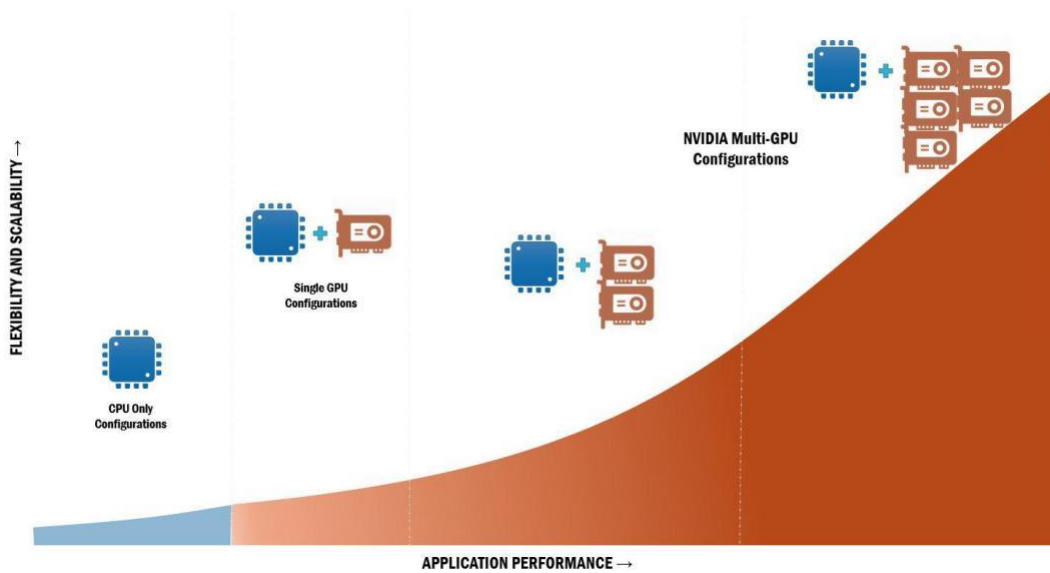


Figure16. Trend Growing Use of Deep Learning at Google

Business Model of Neuron[®] AI

We are trying to create a win-win business model. For example, with multi-server, multi GPU(MSMG) AI deep learning technology, we can partner with mining owners with large

PGU, providing large amounts of AI deep learning computing power and significantly reducing computational cycles. This can serve some AI-intensive companies, such as AI research companies, large game companies and film industries that require AI work. Therefore, our potential strategic partners are mining owners, cloud computing companies, game companies and AI companies.



Figure17. AI Market Size

The Art of Neuron[©] AI

Proof of Value (PoV) – Contributing Through Providing Value

One of the problems of cryptocurrencies based on blockchain is the absence of the real economy corresponding to the value of cryptocurrencies. Proof of Work (PoW), which is the most common consensus mechanism, consumes most of the resources on creating encrypted blocks which contains transaction ledgers. GPU, which seems as an essential tool for developing AI, has degenerated into a tool for simple calculations for mining coins. Moreover, the amount of electricity used in mining is tremendous, almost as much as the annual usage of Bangladesh or Rumania and is steadily increasing³. Another common consensus mechanism is the Proof of Stake (PoS), which rewards users according to stake holdings. The cost for creating blocks is cheaper therefore there is no need to verify diverged chains, resulting in limited blocking for unjust transactions (i.e., Nothing at Stake). To prevent these indictments and serve the mankind through AI technology via realizing the virtue of resources, the *Neuron[©] AI Ecosystem* adapts the principle of **Proof of Value, (PoV)**. According to PoV principle, coins are delivered as rewards when a proper value is created through the rightful use of shared resources. When the *Neuron[©] AI Ecosystem* is misused for malicious purposes, the user gets damaged by paying transaction fees, only getting rewarded when the members of the *Neuron[©] AI Ecosystem* agree that the profits are generated, resulting in a virtuous cycle in the *Neuron[©] AI Ecosystem* through PoV principle.

We are considering using the PoV for the Agreement Algorithm. How one should act could be a method introduced as part of the PoV for the Agreement Algorithm and block storage by modifying the consensus layer or alternatively, for profit sharing based on contributions made while following the existing Ethereum consensus model. The PoV would be applied properly within the ecosystem during the development process.

³ Bitcoin Energy Consumption Index. <https://digiconomist.net/bitcoin-energy-consumption>

Distributed GPU Network via Sharing Economy

To realize the idea of rewarding righteous use of resources and creating values, we seek solution in sharing economy model; members in the *Ecosystem* who desire to contribute to the *Ecosystem* with their hardware resources can make the first setup by sharing their GPU. When their GPU is in an idle state, they should notify that the resources are available in the *Neuron© AI Skeleton*. When there is a request for demanding resources inside the *Neuron© AI Ecosystem*, *Resource Allocator* allocates the idle resources to the requesters. GPUs on the shared network are allocated anonymously to the requesters via *Resource Allocator* in the *Neuron© AI Skeleton*, preventing malicious users from misusing the PoV principle for self-circulating the resources of the *Neuron© AI Ecosystem*.

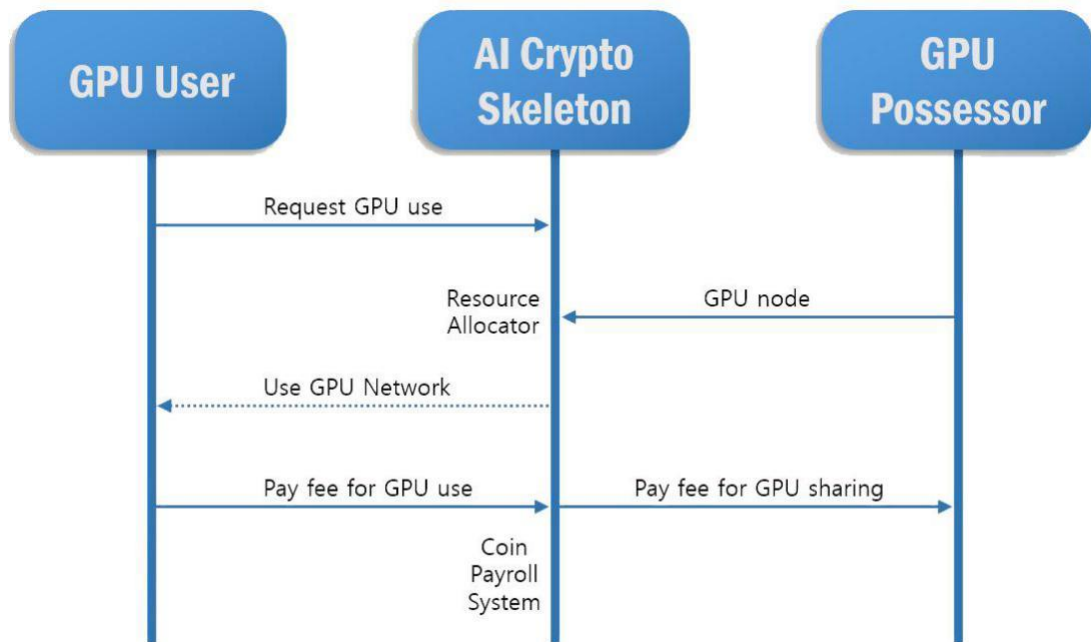


Figure 21. The shared hardware ecosystem is consisted of users and GPU possessors, and the distribution of their resources and rewards are made in the *Neuron© AI Skeleton*.

ERC20 – Embodying the Smart Contract

Neuron© AI Ecosystem would be embodied following the regulations of ERC20 standard. In the early stage of *Neuron© AI Ecosystem*, *Neuron© AI Backbone* would exist to sustain the *Ecosystem*, and will support transactions in cryptocurrency-exchange and transactions between the two different front-end layers in the *Ecosystem*, the *Organism* and the *Vessel*. When the protocols of *Neuron© AI Organism* and *Neuron© AI Vessel* are implemented in the platform, *Neuron© AI Backbone* will evolve into *Neuron© AI Skeleton* and play the role

of the main-net of *Neuron© AI Ecosystem*. *Neuron© AI Skeleton* as the main-net will exist distributed on the cloud and will vitalize Neuron© AI Ecosystem for the sake of the philosophy of decentralization, perfectly independent from any outside regulations.

ERC721 – Resources Sharing and Transaction

In the Neuron© AI Ecosystem Data, Dataset, Model and Trained AI are carried out in the ERC721 format. The ERC721 format features individual Tokens with IDs for each possessor. By using the Tokens or through transferring ownership of said Tokens, NRN transactions will be set into motion in the Neuron© AI Ecosystem. For example, as Data Providers have ownership of the provided Data, Data Providers can be paid a fee from the Data User. AI Developers can earn NRN coins when they are commissioned for AI development, composing Trained AI Models, or transferring ownership of AI Models.

NRN Ecosystem Use Cases

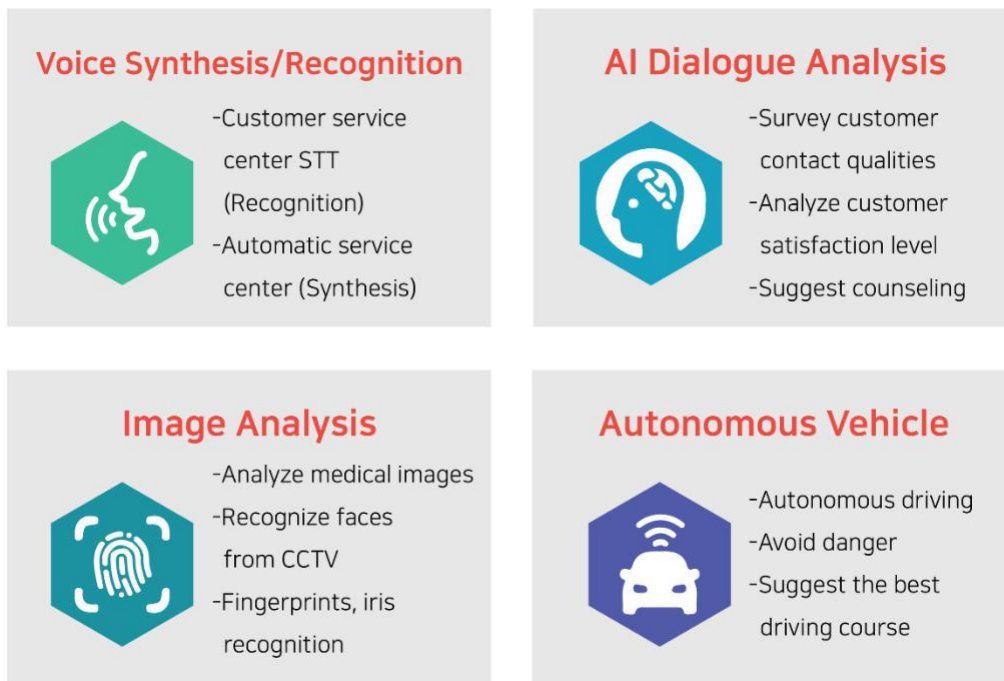


Figure 22. Major use cases of AI that can be applied to Neuron© AI.

AI Service in Voice Recognition / Synthesis

It creates models for voice recognition engine using deep-learning and individualized voice synthesis technology, embody voice recognition services by collecting dataset specialized for specific domains. It also provides a platform where complex factors of voice recognition models

are composed by simple GUI tools without needing the knowledge for programming and be serviced. It also provides items needed for voice recognition and synthesis, making it easier for users to create and provide data, enabling other users who want to create services to use the data easily through rewarding the providers properly.

Dialogue Analysis

It analyzes dialogues between users and consultants, or just users using dialogue analysis technology based on natural language understanding. This can be used to make customized suggestions and to increase sales or enhance the quality of customer counseling. Also, it Analyzes emotion, intent, and context from the previous conversations of the person it is talking to, training the analysis model to draw the best answers, and helping the AI agent to make fluent conversations in the finance, shopping, medical fields, and so on.

Image Analysis

AI based services operating on blockchain such as categorizing images, facial recognition, and fingerprint / iris recognition can be provided via the NRN platform. Unidentified data necessary for training AI model for image analysis will be distributed through the NRN platform, and various image analysis services will be provided using this technology.

Autonomous Vehicle Service

Autonomous vehicle service requires collecting massive amount of data and processing it, as well as conducting numerous calculations quickly. For this, embodiment of a complex artificial neural network and a high-performance computer is required. Through the GPU network provided on the NRN platform, users can develop the AI model for autonomous vehicle and make it into a service.

Neuron© AI (NRN) Coins

10,000,000,000 (10 billion) NRN coins are to be issued and circulated in the Neuron© AI Ecosystem, and members of the ecosystem can participate through Ethereum. The Hardcap of the initial funding is to be limited to 3 Billion NRN. The effective value of the currency would be adjusted in order to preserve the appropriate value by the *Contribution Rating System*. It will be announced on the official channels such as website or the social media network. About 30% of the coins (3,000,000,000 NRN) are to be distributed to fundraisers through ICO.

Distribution Mechanism

The NRN coins will be distributed in the following proportions to the members of the Neuron© AI Ecosystem.

- Investor– 30 %
- Team – 25 %
- NRN Ecosystem Incentive – 20 %
- Marketing – 15 %
- Advisor – 5 %
- Company Reserve – 5 %

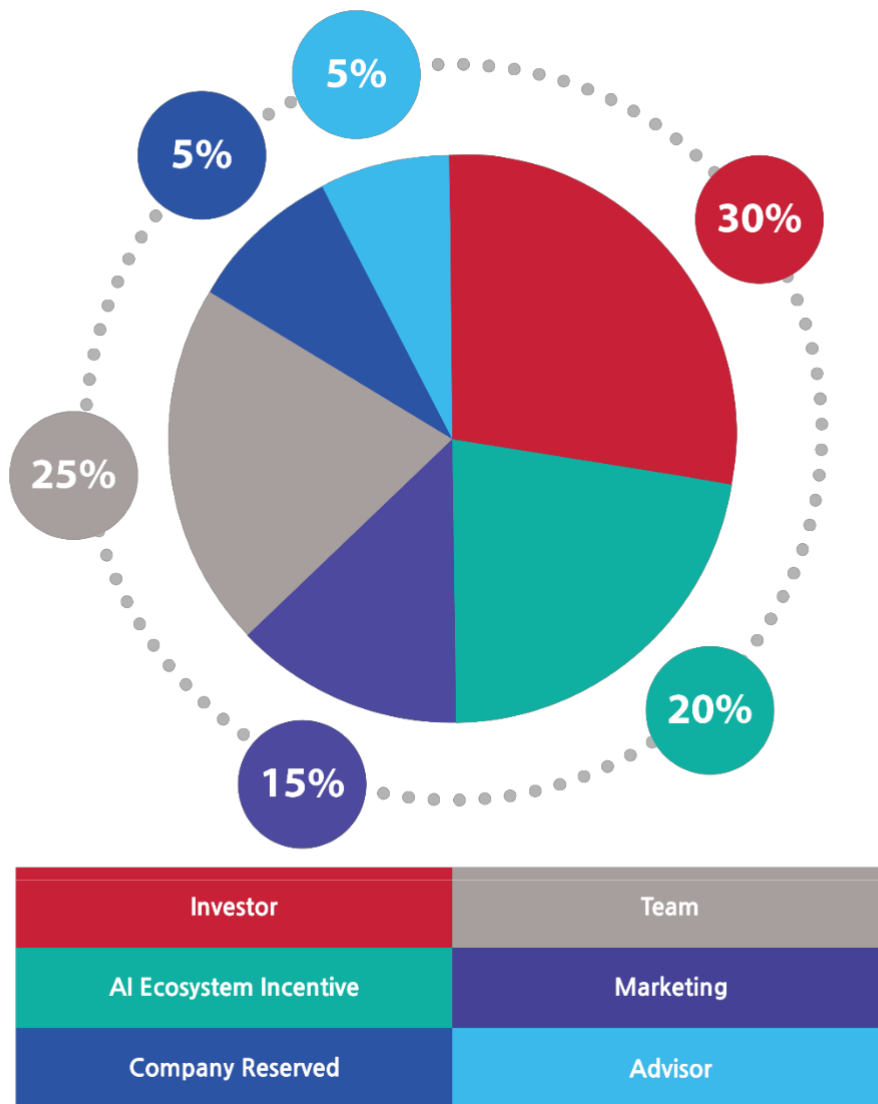


Figure 24. Distribution of Neuron© AI coins

Proceeds Allocation

Development – 42 %

This expense is used for embodying the Neuron© AI platform. This includes costs for developing the platform, embodying and testing the distributed *Resource Allocator* and platform components, making the use case of an AI application operating on the platform, and testing the UI / UX for building dataset.

Operating Expense – 25 %

Operating expense is used for running the Neuron© AI platform before the initial fees are collected. This includes costs for building the initial architecture, and maintaining the GPU Network, Dataset, AI Model and Neuron© AI Ecosystem until they grow large enough to stand independently.

Marketing & Accounting – 14 %

The marketing and accounting expense is necessary to vitalize the Neuron© AI platform. Neuron© AI Ecosystem is alive when members provide and use shared resources in the ecosystem, therefore active participation of the existing providers and consumers of the AI market is vital. This cost does not include marketing costs directly for ICO.

Business/Strategic Expense – 11 %

The goal of the Neuron© AI Ecosystem is to share GPU resources and allocate them to righteous usages, and decentralize major resources and share the benefits, resulting in realizing the values of the Neuron© AI. At the early stage of the platform, a certain amount of administration and/or restriction will be inevitable in order to activate and vitalize the Neuron© AI Ecosystem. For this sake, Business/Strategic expense will be used to effectively manage the shared resources all around the world.

Reserved – 8 %

This expense will later be used for updating the platform.

Plans for Additional NRN Coin Issues

Neuron© AI will operate as an Ethereum based smart contract in its initial version. There are no additional coin issues until this time, and additional coin issues may occur after NRN Main-net hard fork.

The NRN coins will produce blocks and verify transactions in the *Neuron© AI Backbone* based on the cloud. *Neuron© AI Backbone* evolves into *Neuron© AI Skeleton* right after when the Neuron© AI Ecosystem is embodied, which verifies transactions through Proof of Value (PoV) principle. The transaction records are verified by an anonymous node in the *Skeleton*, and additional coins are issued when the resources are used in righteous ways and purposes. These are for rewarding the realization of values created through the righteous use of shared resources, which is the basic purpose of Neuron© AI philosophy. It verifies values by enhancing the usage of Neuron© AI Ecosystem.

The numbers of additional coins issued can be adjusted according to the vitalization of the Neuron© AI Ecosystem. Also, the scale can be modified with the consensus of the members.

Future Plan

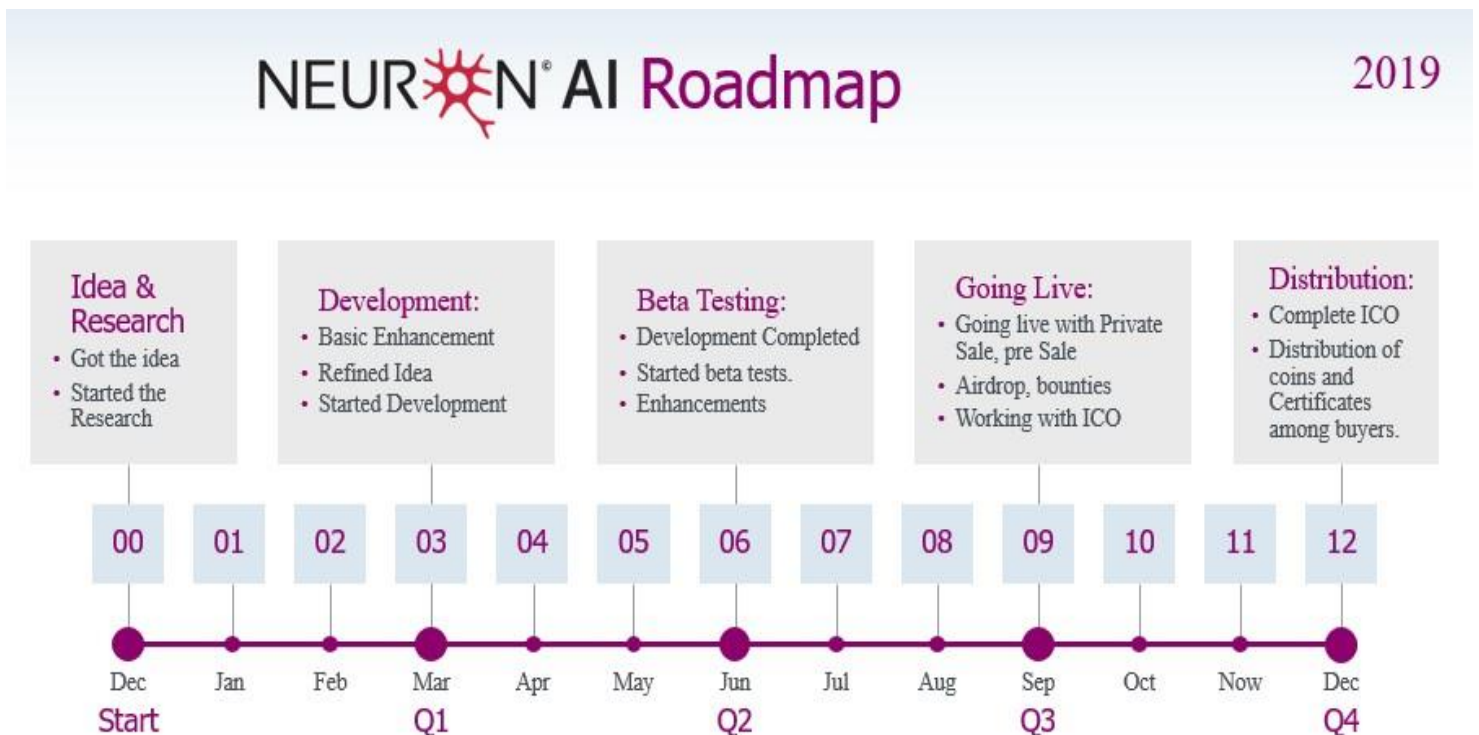


Figure 25. Roadmap

Exchange Listing

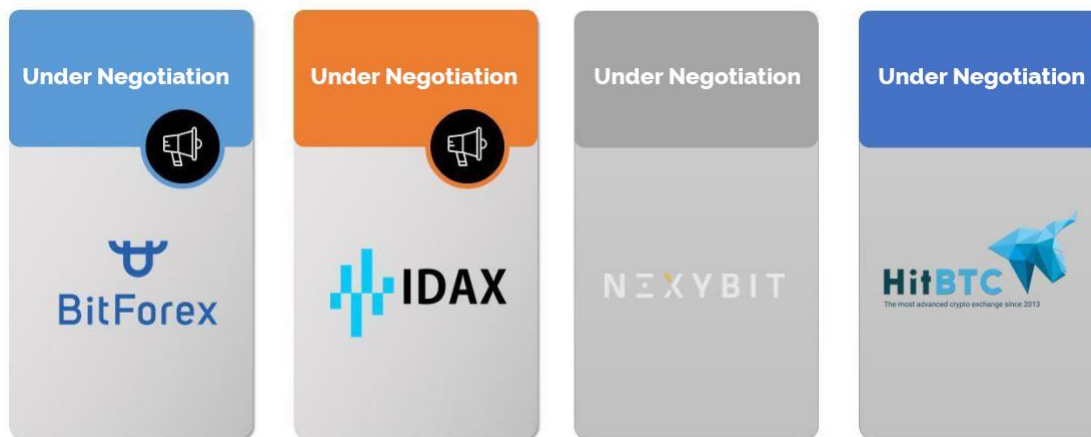


Figure 26. Listing

Preparations for the Future – Change in Platform

Since AI business is the hot topic of the fourth industrial revolution, we are looking forward to various attempts in developing and utilizing AI applications through blockchain technology, starting from the *Neuron© AI Ecosystem*. The Neuron© AI team is open to all kinds of technology if they fulfill the idea of 'righteous usage of impartial resources' and are willing to include them in the AI Ecosystem based on the consensus; this is more than just adding the contents to the ecosystem. Even though the *Neuron© AI Ecosystem* grows larger in scale, this does not mean the birth of a large centralized organization, but the expansion of the decentralized society, resulting in more members agreeing to the righteous usage of resources.

Team Member & Advisor

Figure 27. Team Member

Figure 28. Advisor